

MMT BRIEF

Typhoon Soudelor Impacts: *Sea Touch* Debris; Preliminary Assessment of Damages to Seagrass Habitat



BECQ Marine Monitoring Program

14 September 2015

Report generated for the CNMI Bureau of Environmental and Coastal Quality



Overview

The *Sea Touch Shark and Stingray Marine Park*, owned and operated by SEA-TOUCH, LLC, was located in the Saipan Lagoon, immediately offshore of the Fiesta Resort in Garapan (Fig. 1). The facility consisted of a 100 ft x 100 ft holding pen and petting area which was lined with floating pontoon walkways and connected to the beach with an 80 ft x 6 ft floating dock. The holding pen and petting areas for the sharks and rays consisted of chain link fence panels connected to the floating walkways and anchored by 8-inch PVC pipes filled with concrete. The whole structure was held in place by 20, 2 ft x 2 ft concrete block anchors.

As a condition of their Major Siting Coastal Permit (SMS-2013-X-07), in the case of a typhoon, SEA-TOUCH, LLC was to enact the Typhoon Emergency Plan (TEP) that was submitted as part of the Environmental Impact Assessment for the project. As part of this plan, the holding pens and walkways would to be removed and properly secured on land and the animals would be relocated to a secure inland tank facility. However, as Typhoon Soudelor approached Saipan, SEA-TOUCH, LLC failed to enact their TEP, leaving the entire structure and the animals in place to weather the storm. Typhoon Soudelor passed directly over Saipan on August 2, 2015, with sustained winds of approximately 127 mph and gusts to at least 150 mph, resulting in severe and widespread damages across the island. The Sea Touch facility (including pontoons, concrete anchors, fencing, chains, and hardware) was severely damaged, dismantled, and dragged across a relatively large area of seagrass habitat between the Fiesta Resort and the south side of the American Memorial Park. The sharks and rays were lost. This report describes initial assessments of the resultant marine debris and environmental damages caused by the destruction and movement of the Sea Touch facility during the storm.

Preliminary Assessments of Environmental Damages

On August 14, 2015 the BECQ Marine Monitoring Team (MMT) conducted a pre-assessment of damages caused to the natural resources by the movement of SeaTouch's structures. The state of the structure and surrounding environment was assessed and documented with photographs. This assessment revealed that the Sea Touch facility caused substantial damages to marine resources during the storm and that debris from the structure was continuing to negatively impact the environment. Damages detected during the assessment include scars in seagrass meadows caused by the movement of SeaTouch's concrete anchors, smothering of seagrass by SeaTouch's chain link fence, and shading of seagrass by SeaTouch's floating walkways as they persisted in their new position fronting American Memorial Park.

On August 24, 2015, the MMT returned to the site to map the area and collect geo-referenced photographs of debris and environmental damages and begin to quantify damages to seagrass habitat. Due to time constraints, these efforts were focused on the seagrass meadows fronting Fiesta Resort, where a large amount of debris and damages were located. A snorkeler with a hand-held GPS unit and a camera covered an area of approximately 32,000 m², locating, photographing, and taking GPS coordinates of debris and environmental damages (Fig. 1). Additionally, 5, 10 m transects lines were laid out along the length of a single scar in the seagrass meadow (Fig. 1). Transects were placed 2 meter

apart and benthic cover was determined using a line intercept transect (LIT) method, where the biota or substrate under the line at each 10 cm mark was recorded. This procedure was repeated in immediately adjacent, non-impacted seagrass habitat.

Findings

Although the floating pontoons had been removed and secured on land by the second survey on August 24, 2015, a large amount of subsurface debris remained in the marine environment, continuing to affect the seagrass habitat and associated marine life. Debris included large concrete poles, concrete block anchors, chains, various pieces of hardware, and chain-link fencing, including a large section measuring 35 m x 1.5 m (Fig. 1).

The habitat impacted was a mixed seagrass/macroalgae meadow dominated by the seagrass species *Halodule uninervis*, interspersed with patches of sand. The quality or integrity of seagrass habitat is often assessed using the ratio of seagrass to macroalgae cover as high macroalgae cover is indicative of poor water quality (Houk and Camacho, 2010). Part of the area impacted by the Sea Touch facility was high quality seagrass habitat as indicated by the high average seagrass to macroalgae ratio of the surveyed reference (non-impacted) transects (4.3:1). Many scars were observed in the seagrass and macroalgae habitat across the area surveyed, ranging in length from 1 m – 145 m. Scars were characterized as denuded areas where damaged seagrass blades and seagrass rhizomes and macroalgae holdfast which had been ripped up from the substrate, were visible. Not surprisingly, our results showed that the surveyed scar had significantly more sand and significantly less seagrass and macroalgae than the reference area (Fig. 3).



Figure 1 Map of impacted seagrass habitat (yellow boundaries), a representative *subset* of observed debris and environmental damages, and impacted (red line) and reference (green) transects. 01: final location of large sections of floating walkway, anchors, chains, and fencing; 02: large section of chain link fence (35 m x 1.5 m); 03: series of linear scars (orange box); 04: large pile of debris; 05: concrete pole anchor and beginning of linear scar; 06: concrete block anchor; 07: debris surrounded by seagrass scars; 08: surveyed impact transect (red line) within large linear seagrass scar (white line); 09: concrete anchors; 10: non-impacted reference transect (green line). Note: these points are merely a representative subset of the debris and damages observed, not a complete inventory.



Figure 2 Representative photographs of debris and environmental damages caused by the destruction of the Sea Touch facility during Typhoon Soudelor.

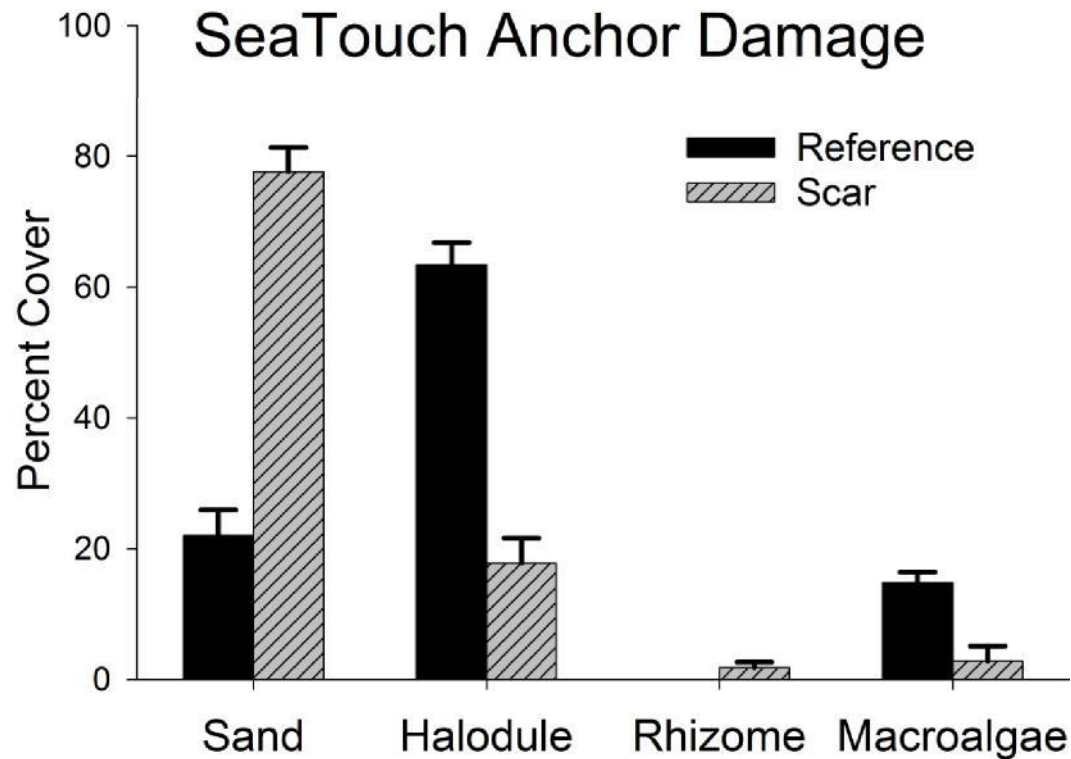


Figure 3 Benthic percent cover (mean \pm SE) of major constituents in Reference and impacted (Scar) survey transects (n = 5 each). Paired t-tests were carried out to test for differences in mean percent cover for each major category; *p < 0.01.

Summary

Seagrass beds are incredibly diverse and productive ecosystems that provide food, habitat, and nursery grounds for a variety of organisms including commercially and culturally valuable fish and invertebrates. Seagrasses dampen wave energy and physically trap sediments, protecting against shoreline erosion and sedimentation of offshore coral reefs. Seagrass beds are also huge carbon sinks; per hectare, they sequester more carbon than terrestrial forests and may buffer associated coral reef ecosystems from the effects of ocean acidification.

In violation of their DCRM permit conditions, SEA-TOUCH, LLC failed to enact their Typhoon Emergency Plan as Typhoon Soudelor approached Saipan on August 2, 2015. As a result of a direct hit from the category 3 typhoon, the Sea Touch facility was destroyed and debris was dragged and scattered over a large area of ecologically valuable seagrass habitat. Many scars, including one measuring 150 m in length, were created in the seagrass meadows from heavy concrete anchors, fencing, and hardware. In the surveyed scar, seagrass cover was reduced by nearly 80%. Seagrass scars can take several years to fully recover, depending on the species, extent of damage, and environmental conditions (Creed &

Amado 1999; Dawes et al. 1997; Hallac et al. 2012). Additionally, as of the survey date, a large amount of debris remained in the environment, continuing to negatively affect the ecosystem.

References

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MMT BRIEF

Typhoon Soudelor Impacts: F/V *Lady Carolina* Grounding; Overview and Preliminary Coral Reef Damage Assessment



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Overview

On August 2, 2015, Typhoon Soudelor passed directly over Saipan with sustained winds of approximately 127 mph and gusts to at least 150 mph, resulting in severe and widespread damages across the island. During the storm, the fishing vessel *Lady Carolina* broke free of its mooring at Smiling Cove Marina and was blown into the Saipan Lagoon, where it ran hard aground on inshore patch reef habitat (Fig. 1).

The *Lady Carolina* is owned by Saipan USA Fisheries, Inc. The vessel was built in 1997; it is 25 m (83 ft) long with a breadth of 7.2 m (24 ft) and a depth of 3.8 m (12.5 ft). At the time of the grounding, it was estimated that there was approximately 1000 gallons of diesel fuel on-board. Shortly after the incident, the responsible party (RP) contracted Pacific Marine Enterprises, Inc. (PME) to assess the integrity of the hull and remove any pollution from the vessel. Initial assessments conducted by PME, with oversight by the US Coast Guard, revealed that the ship was hard aground at the edge of a patch reef, leaning to the port side at an approximately 60 deg angle with the bow facing northwest. There was an ~18 in x 4 in gash in the hull on the port side, which breached the fuel tank, resulting in open communication between the fuel tank and the surrounding waters during rough seas. A light sheen was observed on the outside of the vessel and an estimated 6 ft of oily water was observed in the engine compartment. The backside and the fish holds were dry.

Beginning on August 13, 2015, the RP representative and other relevant parties, including the US Coast Guard, the Commonwealth Ports Authority, the Division of Fish and Wildlife, the Bureau of Environmental and Coastal Quality (BECQ), and the National Oceanic and Atmospheric Administration met weekly to review the status of the vessel and pollution removal operation.

Although the RP coordinated and funded the pollution removal efforts, at the time of this report, they had yet to submit a salvage plan to the Coast Guard or the CNMI government to remove the vessel from the reef. Of note, Saipan USA Fisheries, Inc. filed for protection under Chapter 7 of the United States Bankruptcy Code on June 17, 2015 and on September 2, 2015, the Bankruptcy Court issued a dismal order. The CNMI government requested a FEMA mission assignment to remove the *Lady Carolina* and its sister ship, the *Miss Saipan*, which grounded at the Port of Saipan, but was denied. The CNMI is currently exploring additional options for the salvage of these two vessels.

Pollution Removal

The pollution removal efforts were led by the RP (work conducted by PME) with oversight by the US Coast Guard. Pollution removal was not Federalized as the RP was cooperative and mobilized to remove the pollution in a timely manner. Operations were conducted from August 17-25, 2015. The following totals were recovered from the vessel:

- 2,305 gallons of diesel were collected and contained in drums. All fuel tanks were sounded and found dry
- 90 gallons of hydraulic oil with negligible residual in hydraulic systems
- 10 gallons of lubricating oil with negligible residual in engine/generators

- 4 marine grade batteries
- 5 pounds of R22 refrigerant leaving all AC&R systems empty
- An estimated 14,000 gallons of oily water mixture remained in the engine room which has free communication with the ocean during rough seas due to the gash in the port side of the hull. No sheen was observed outside of the vessel.

Preliminary Coral Reef Assessment

On August 26, 2015, four members of the BECQ marine monitoring team visited the grounding site to conduct an initial assessment of and map the impacted coral reef and surrounding areas. The locations of the hull and surrounding damaged coral reef habitat were recorded using a hand held gps unit at the surface and later mapped using ArcGIS software (Fig. 1). A preliminary coral species list was recorded and the area was searched for the three coral species listed as Threatened under the US Endangered Species Act (*Acropora globiceps*, *A. retusa*, and *Seriatopora aculeata*). The area and damages were also documented with photographs.

Findings

Snorkelers swam approximately 4,000 m² around the grounded vessel. The depth of the patch reef ranged from 0 m – 6 m. The shallow crest was dominated by macroalgae with coral becoming more abundant around the slightly deeper margins. Several large (> 1 m) coral colonies (mostly massive *Porites* spp.) were scattered around the periphery, near the stern and along the port side and bow of the vessel. Fourteen coral species from ten genera were recorded at the site (Table 1); no ESA listed species were observed.

Approximately 560 m² of mid-lagoon patch reef habitat has been impacted by the grounding incident (Fig. 1). Damages to natural resources include crushed, fractured, and scraped corals and coral reef habitat (Fig. 2). Several large *Porites* spp. coral heads were dislodged, overturned, and fractured (Fig. 2). Small piece of rusted metal and paint from the hull were also observed on the substrate (Fig. 2).

Table 1. List of predominant hard coral species observed at the grounding site. Note: coral species data were collected during a brief snorkel and are likely an underestimate of the true number of species present at the site.

Coral Species
<i>Favia matthai</i>
<i>Galaxea fascicularis</i>
<i>Goniastrea retiformis</i>
<i>Heliopora coerulea</i>
<i>Isopora palifera</i>
<i>Leptastrea purpurea</i>
<i>Montipora c.f. hoffmeisteri</i>
<i>Pocillopora anekli</i>
<i>Pocillopora damicornis</i>
<i>Porites cylindrica</i>
<i>Porites lobata</i>
<i>Porites lutea</i>
<i>Porites sp.</i>
<i>Psammocora digitata</i>

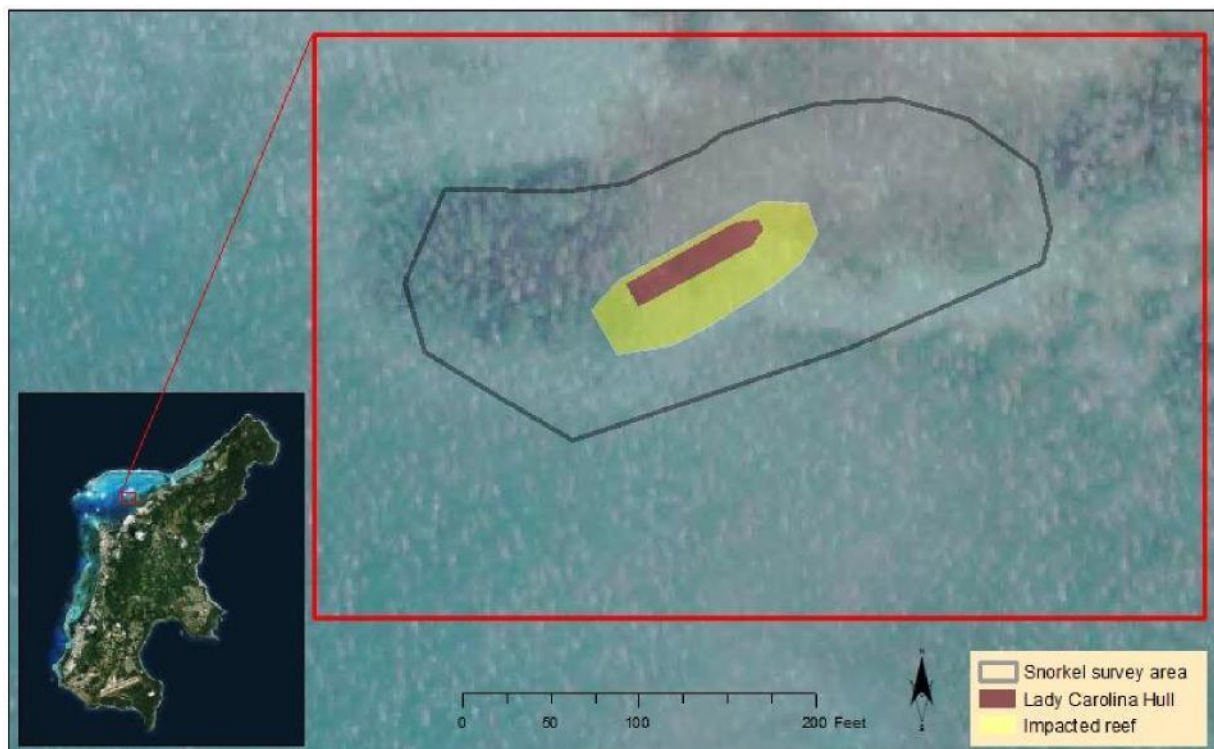


Figure 1. Map of the grounding site and impact areas



Figure 2. Examples of damages incurred by corals and reef habitat as a result of the F/V *Lady Carolina* vessel grounding in the Saipan Lagoon.

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